



MAASAI MARA UNIVERSITY

**UNIVERSITY EXAMINATIONS
2018/2019 ACADEMIC YEAR
SECOND YEAR FIRST SEMESTER EXAMINATION**

**SCHOOL OF SCIENCE
DEPARTMENT OF MATHEMATICS AND PHYSICAL
SCIENCES
DEGREE IN BACHELOR OF SCIENCE IN CHEMISTRY**

**COURSE CODE: CHE 416
COURSE TITLE: ORGANIC SYNTHESIS**

DATE: 26TH APRIL, 2019

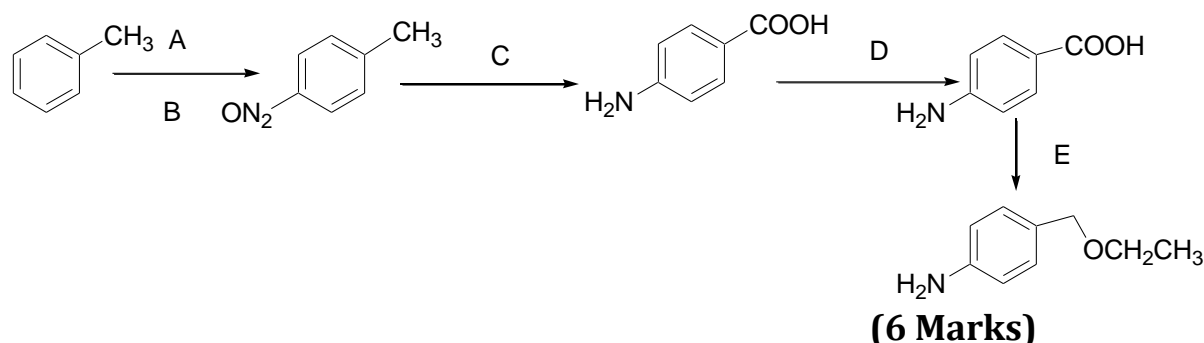
2:30-4:30PM

INSTRUCTIONS:

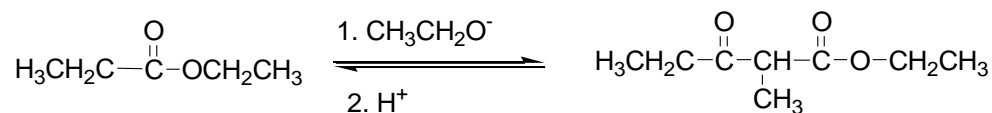
Answer question **ONE** and any other **TWO** questions

(QUESTION ONE 30 Marks)

1. (a) State four reasons for synthesizing organic compounds **(2 Marks)**
- (b) Explain the steps involved in designing an organic synthesis **(4 Marks)**
- (c) State the basics for designing a synthesis **(5 Marks)**
- (d) In the retrosynthetic analysis of Muscular, show the disconnections and functional group interconversions and identify the synthons and their synthetic equivalents **(4 Marks)**
- (e) Identify all the reagents marked A,B,C,D,E in the conversion below



- (f) (i) Outline two ways in which 4-methyl-2-Octane can be prepared by conjugate addition on Organocuprate to α,β unsaturated ketone. **(2 Marks)**
- (ii) Give the mechanism for the reaction below **(5 Marks)**



QUESTION TWO (20 MARKS)

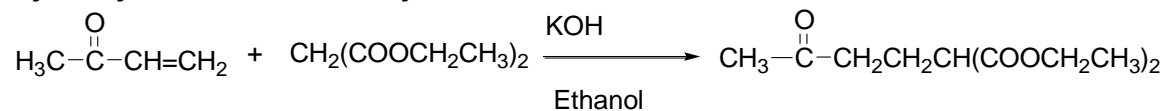
2. (a) What is Michael addition **(1 Marks)**
(b) Using a reaction mechanism show how 5,5-dimethylcyclohexane-1,3-dione is synthesized from 4-methylpent-3-en-2-one and diethylmalonate **(7 Marks)**
(c) Using appropriate example show the Dieckmann cyclization **(4 Marks)**
(d) Give the mechanism of the Sodium-Ammonia reduction of an alkyne. **(8 Marks)**

QUESTION THREE (20 Marks)

3. (a) State three qualities of a protecting group **(3 Marks)**
(b) Give the mechanism for the following reaction
- $$\text{H}_3\text{C}-\overset{\text{O}}{\parallel}\text{COCH}_2\text{CH}_3 \xrightarrow[2. \text{H}_3\text{O}]{1. \text{NaOCH}_2\text{CH}_3} \text{H}_3\text{C}-\overset{\text{O}}{\parallel}\text{C}-\underset{\text{H}_2}{\text{C}}-\overset{\text{O}}{\parallel}\text{COCH}_2\text{CH}_3 + \text{CH}_3\text{CH}_2\text{OH}$$
- (5 Marks)**
- (c) (i) What is Clemensen's reduction **(1 Mark)**
(ii) State two types of synthetic routes **(1 Mark)**
(iii) Name all the reagents used in Lindlar's catalysts **(2 Marks)**
(iv) Using a specific example show the Baeyer-Villiger **(3 Marks)**
- (d) Consider Benzocaine
- (i) Carry out its retrosynthesis
(ii) Write its synthesis **(5 Marks)**

QUESTION FOUR (20 Marks)

4. (a) The enolates of ethylacetoacetate and diethylmalonate undergo Michael addition. Give the mechanism for the reaction below and the final product when the Michael adduct is subjected to ester hydrolysis and decarboxylation



(6 Marks)

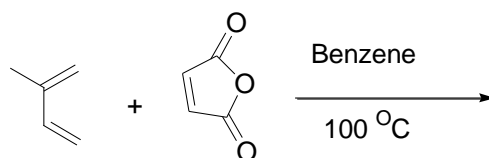
- (b) What is Diels-Alder reaction **(2 Marks)**

- (c) Show how the amine group is protected in the conversion below



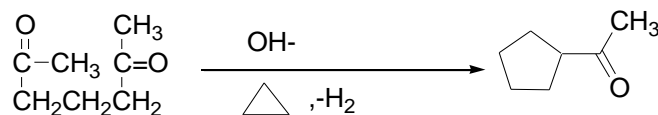
(3 Marks)

- (d) Complete the reaction below



(1 Mark)

- (e) (i) Define hydroboration **(1 Mark)**
(ii) Give the mechanism for the reaction below **(4 Marks)**



- (iii) Starting with Phenol show how Aspirin is synthesized

(3 Marks)

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